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A new species and a new record of *Erysiphaceae* from China

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Abstract—The new species *Podosphaera setacea* on *Crataegus sanguinea* (*Rosaceae*) in China, intermediate between species of *Podosphaera* sect. *Podosphaera* and sect. *Sphaerotheca*, is described, illustrated, and compared with the morphologically similar species *Podosphaera tridactyla*, *P. ferruginea* and *P. spiraeae*. A new record for China, *Erysiphe buhrii*, is recorded on the new host species *Stellaria dichotoma* var. *lanceolata*.

Key words—*Erysiphales*, powdery mildews, taxonomy

Introduction

Several interesting specimens of powdery mildew fungi were collected in Chifeng City, Inner Mongolia Autonomous Region, in the north of China in 2008. One of them was a species of *Podosphaera* Kunze on *Crataegus sanguinea* resembling an immature collection of *P. tridactyla* (Wallr.) de Bary (*Podosphaera* sect. *Podosphaera*) with each appendage bearing a simple, unbranched apex. However, asci and ascospores were fully developed and mature, suggesting that the appendages in this species remain unbranched. Furthermore, *P. tridactyla* does not occur on *Crataegus* spp. The Chinese species on *Crataegus* has been compared with other *Podosphaera* species on *Rosaceae* and was determined to be a distinct, new species. Another specimen represented a new record for China, viz. *Erysiphe buhrii* on *Stellaria dichotoma* var. *lanceolata*, a new host for this species.

Materials and methods

Material was mounted in distilled water and examined using 100X oil immersion objectives (bright field and phase contrast), but without any staining, using standard light microscopy. For each collection, 60 measurements of conidia and other structures were made in water, with extremes given in parentheses.

Collections were deposited in the Mycological Herbarium of the Chifeng College, Inner Mongolia, China ("CFSZ") and the Herbarium of Martin-Luther-University, Halle (Saale), Germany (HAL).

Taxonomy

(1) ***Podosphaera setacea*** T.Z. Liu & H.M. Tian, **sp. nov.** Fig. 1

MycoBank MB 515405.

Podosphaerae tridactylae *similis, sed appendicibus chasmotheciorum simplicibus, non ramosis.*

Etymology: derived from the stiff, setiform chasmothecial appendages.

Mycelia on stems and leaves, amphigenous, forming distinct white patches or irregular coats, persistent or subpersistent, strongly infected stems frequently disfigured and distorted. Hyphae 5–7(–9.5) µm wide, hyaline, smooth, thin-walled. Appressoria nipple-shaped. Conidiophores erect, 48–214 µm long, foot-cells cylindrical, straight or somewhat flexuous, (32–)70–112 × 9–13 µm, basal septum often somewhat distant from the branching point of the mycelium, 6–16 µm. Conidia in chains, ellipsoid-ovoid or doliiform, with fibrosin bodies, 17.5–35 × 10–17.5 (average 26 × 14) µm. Chasmothecia on stems, gregarious, dark brown, globose or subglobose, (55–)60–80(–90) (average 71) µm diam. Peridium cells irregularly polygonal, 10–27.5 µm diam. Appendages 3–8, arising from the upper half of the chasmothecium, not mycelium-like, setiform, simple, straight or curved, (0.5–)1–2(–3) times as long as the chasmothecial diam., (30–)70–150(–210) µm long, 7–11 µm wide near the base, narrower towards the apex, 5–7.5 µm wide at the tips, thick-walled, smooth or rarely verruculose, 3–7(–9)-septate, brown throughout or in the basal half, paler towards the apex, apical portion hyaline. Asci subglobose or ovate-saccate, sessile or short-stalked, 50–80 × 37.5–70 (average 66 × 56.5) µm. Ascospores 8 per ascus, ellipsoid or ovoid, 15–21 × 10–16 (average 19 × 13µm) µm.

Specimen examined: CHINA. Inner Mongolia, Chifeng City, Bairin Right Banner, Saihanwula National Nature Reserve, Rongsheng, on living leaves and stems of *Crataegus sanguinea* Pall. (*Rosaceae*), 20 Jul. 2008, T.Z. Liu, C. Sun & J. Zhang, CFSZ 1230 (**holotype**); HAL 2324 F (**isotype**).

Comments: On the basis of terminal, setiform, septate, pigmented chasmothecial appendages, the new species on *Crataegus sanguinea* in China appears close to *Podosphaera tridactyla*, a common, widespread species on hosts of *Prunus* s. lat., although appendage apices of the former fungus are consistently unbranched. Species with unbranched appendages usually are placed in *Podosphaera* sect. *Sphaerotheca* (Lév.) U. Braun & Shishkoff. With regard to the characters of the chasmothecial appendages, *P. setacea* is intermediate between *Podosphaera* sect. *Podosphaera* and sect. *Sphaerotheca*, although this species is rather allied to *P. tridactyla*. *Podosphaera leucotricha* is another species of *Podosphaera*

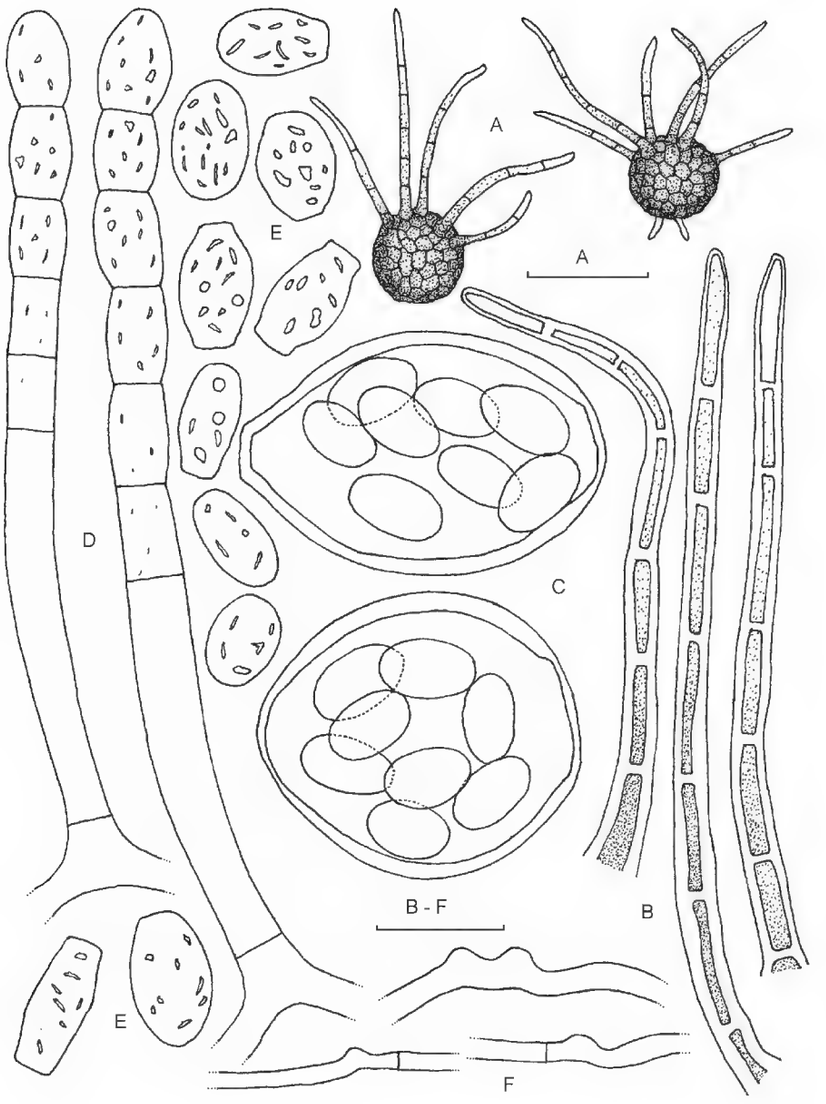

Fig. 1. *Podosphaera setacea* (holotype).
A. Chasmothecia, B. Appendages, C. Asci and ascospores,
D. Conidiophores, E. Conidia, F. Hyphae and appressoria.
Scale bar = 100 μm (A), 25 μm (B-F). T.Z. Liu del.

sect. *Podosphaera* characterized by having terminally arising appendages with usually unbranched apex. There are seven species of *Podosphaera* sect. *Sphaerotheca* on hosts of the *Rosaceae*, *Podosphaera aphanis* (Wallr.) U. Braun & S. Takam. [≡ *Sphaerotheca aphanis* (Wallr.) U. Braun], *P. ferruginea* (Schltdl.) U. Braun & S. Takam. [≡ *S. ferruginea* (Schltdl.) L. Junell], *P. niesslii* (Thüm.) U. Braun & S. Takam. [≡ *S. niesslii* Thüm.], *P. pannosa* (Wallr.) de Bary [≡ *S. pannosa* (Wallr.) Lév.], *P. spiraeae* (Sawada) U. Braun & S. Takam. [≡ *S. spiraeae* Sawada, incl. *S. filipendulae* Z.Y. Zhao], *P. stephanandrae* (Jacz.) U. Braun & S. Takam. [≡ *S. stephanandrae* Jacz.], and *P. volkartii* (S. Blumer)

U. Braun & S. Takam. [≡ *S. volkartii* S. Blumer] (Braun 1987, 1995; Chen et al. 1987, Nomura 1997, Shin 2000). Most of these species are quite different from *P. setacea,* forming mycelioid appendages arising from the lower half of the chasmothecia. *Podosphaera ferruginea* and *P. spiraeae* are morphologically somewhat closer to the present species since they are characterized by having non-mycelioid, more setiform appendages, arising from the upper half of the chasmothecia (at least partly), but the two species are easily distinguishable from *P. setacea* by having ascomata with numerous (5–25), much longer appendages (about 1–6 times as long as the chasmothecial diam.) with thinner walls. Furthermore, the appendages are not terminal as in *P. setacea*, and they are horizontally spread.

(2) ***Erysiphe buhrii*** U. Braun, Česká Mykol. 32(2): 80, 1978. Fig. 2

≡ *Erysiphe pisi* var. *buhrii* (U. Braun) Ialongo, Mycotaxon 44(1): 255, 1992.
(belonging in *Erysiphe* sect. *Erysiphe*)

Mycelia amphigenous, effuse or forming thin white patches, often occupying the whole leaf surface, persistent or subevanescent. Hyphae 3.5–8 µm wide, hyaline, thin-walled, smooth or rarely verruculose. Appressoria distinctly lobed, opposite or single. Conidiophores erect, 80–128 µm long, foot-cells cylindrical, straight or sometimes flexuous, 26–64 × 8–11 µm, followed by 1–2 shorter cells, rarely a single second cell of approximately the same length. Conidia formed singly, ellipsoid or cylindrical, rugose (dried!), 26–37 × 12–19 µm. Chasmothecia scattered to gregarious, dark brown, depressed globose, 98–144 µm diam. Peridium cells irregularly polygonal, 10–20(–26) µm diam. Appendages 10–30, in the lower half of the chasmothecium, mycelium-like, mostly interlaced with the mycelium, simple or frequently 1–2(–3) times irregularly to subdichotomously branched, flexuous, sometimes tortuous to geniculate, 0.3–1(–2.5) times as long as the chasmothecial diam., 40–170(–274) µm long, 3–6.5(–10) µm wide, thin-walled, smooth to somewhat rough, 0–4 (–6)-septate, hyaline, yellowish to pale brown in the basal half, paler towards the apex, terminal portion hyaline, occasionally brown throughout, appendages short. Asci (3–)4–9(–10), oval, oblong-oval or irregularly shaped, short-stalked or sessile, 64–88 × 25–43 µm. Ascospores (2–)3–5(–6) per ascus, ellipsoid or ovoid, yellowish, 19–26 × 11–18 µm.

Specimen examined: CHINA. Inner Mongolia, Chifeng City, Hexigten Banner, Dalainur National Nature Reserve, Zhenzi Mountain, ca. 1350m alt., on living leaves of *Stellaria dichotoma* var. *lanceolata* Bunge (*Caryophyllaceae*), 5 Aug. 2008, T.Z. Liu & C. Sun, CFSZ 1309.

Comments: Compared to the description of *Erysiphe buhrii* in Braun (1987, 1995), the foot-cells of the conidiophores in the present collection from China are somewhat shorter and wider, 26–64 × 8–11 µm [versus (35–)40–75(–100)

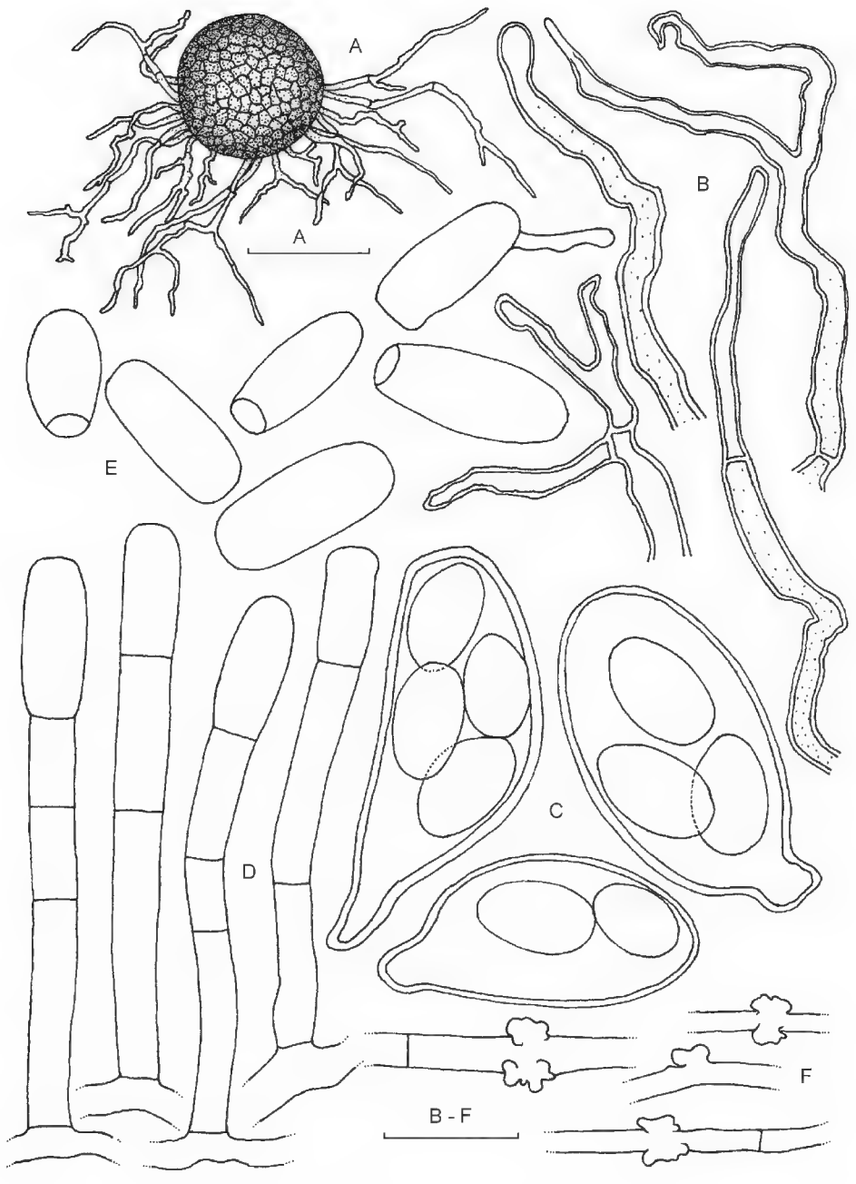

Fig. 2. *Erysiphe buhrii*.
A. Chasmothecium, B. Appendages, C. Asci and ascospores,
D. Conidiophore, E. Conidia, F. Hyphae and appressoria.
Scale bar = 100 μm (A), 25 μm (B-F). T.Z. Liu del.

× 6.5–8.5(–10) μm], and the conidia are somewhat smaller, 26–37 × 12–19 μm [versus 30–50 × 14–22.5 μm]. However, the characters of the chasmothecia fully agree with those of *E. buhrii*. The differences in the dimensions of the anamorphs are regarded as modifications and variation within *E. buhrii*. This powdery mildew fungus is new to China, with *Stellaria dichotoma* var. *lanceolata* as new host plant for this fungus (Braun 1987, 1995; Amano 1986).

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